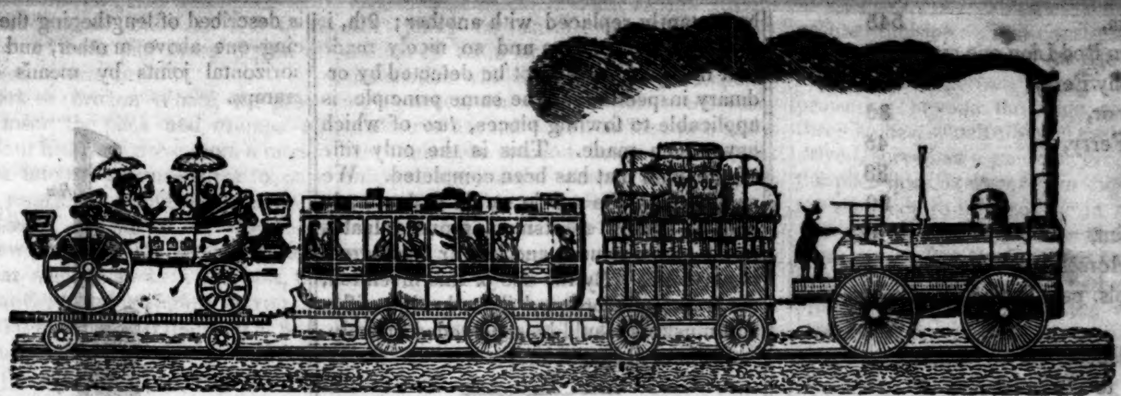

AMERICAN RAILROAD JOURNAL,

AND ADVOCATE OF INTERNAL IMPROVEMENTS.

PUBLISHED WEEKLY, AT NO. 30 WALL STREET, NEW-YORK, AT FIVE DOLLARS PER ANNUM, PAYABLE IN ADVANCE.

D. K MINOR, and GEORGE C. SCHAEFFER, } EDITORS AND PROPRIETORS.] SATURDAY, JUNE 10, 1837. VOLUME VI.—No. 23.

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AMERICAN RAILROAD JOURNAL.

NEW-YORK, JUNE 10, 1837.

REMOVAL.—The Office of the RAILROAD JOURNAL, NEW-YORK FARMER, and MECHANIC'S MAGAZINE, is removed to No. 30 WALL-STREET, *basement story*, one door from William street, and *opposite the Bank of America.*

MCADAM ROADS—*Indiana Improvements* We extract the following from a letter received from a gentleman in Indiana, in relation to the public works of that State.—This road is constructed at the expense of the State. We are doubly obliged to Mr. Frazer, the writer, for his communication It is one of the most *interesting* which has come to hand of late—as it furnishes us at the same time with *useful information—four new subscribers and cash fifteen Dollars—a rare* combination, and amount of good fortune, these hard times.

This Road when finished from New-Albany to Vincennes will be about 104 miles long. Forty-one miles of said road (the distance from New-Albany to this place) are now under contract for graduation and bridging. The whole number of laborers now engaged in the construction of it between said points, amounts to 956 persons. The payments on estimate to the contractors for the month of April, amounted to $16.450.00. The plan of construction in every respect is similar to that of the Cumberland road, in this State and in Ohio. The maximum grade on this road is $\frac{1}{16\frac{1}{3}6}$ or 3½ degrees, and the minimum grade for the ditches is $\frac{1}{3\frac{1}{4}}$, or 10 minutes. The country between New-Albany and Vincennes is undulating, abounding with limestone of superior quality for metalling, and also with a great abundance of fine timber for bridging. I have rounded all the angles on this road with curves, none of which have a less radius than 600 feet. The whole cost of the graduation and bridging between this place and New-Albany, when finished will be $207,921 71—giving an average per mile of $5071 26.

The following statement shows the number of miles there are of 3½ degrees grade, of 3 degrees grade, of 2½ degrees grade, and of 2 degrees grade and under, between New-Albany and this place.

GRADES.

Of 3½ degrees.	Of 3 degrees.	Of 2½ degrees.	Of 2 degrees and under.	Total distance.
miles.	miles.	miles.	miles.	miles.
7.23	1.32	3.33	29.62	41 50

I am sir, very respectfully,

Your obedient servant,

JNO. FRAZER.

Engineer New-Albany and Vincennes McAdamized Turnpike Road.

REVOLUTIONARY DOCUMENT.—The following is a copy of a document found among the papers of a Revolutionary officers now no more, who took an active part in the stirring scenes of that period. It appears to be a statement of the proceedings and expenses —*in continental money*, the currency of that day—of establishing the claim of Messrs ———, ——— & ———, to certain goods which were seized at Woodbury, N. J., on the 11th of August, 1780. It is an interesting document, exhibiting the great depreciation of the currency of the days in which our fathers fought and bled for liberty.

"An Account of Cost and Expenses of the Seizure of the Goods belonging to ———, ——— & ———, at Woobury, N.J., 11th day August, 1780:

Going to Newark Mountain, for advice of the Attorney,	50 Dollars.
Cost of Jury,	67
Going to Elizabeth Town,	65
Horse Hire and Time,	120
To procure a Witness to go to Philadelphia,	8
The Expenses of going to Phila., Brunswick Ferry,	12
Brunswick all Night,	116
6 Mile Run,	60
Maidenhead,	54
Trenton Ferry and Way,	50
Bristol,	90
Neshamony Ferry,	16
10 miles from Phila.,	36

Phiadephia,	545
On Return Red Lion one night,	112
Neshamony Ferry,	16
Pens Manor,	36
Trenton Ferry,	45
Trenton,	30
Prince,	90
6 Mile Run,	116
Hire of Horses and Wagon at 210 Dols. per Day, 5 Days is	1050
The Evidences and my Time going to Philadelphia, 5 Days each, at 70 Dollars per Day,	700
To get White Matlacks Deposition,	16
To geting sôme Bills Proved at Elizabeth Town,	9
For the Evidences going to Elizabeth and attending the Trial,	140
Our own time in attending Trial,	214
Docts. Lester and Gallaudet, attending Trial one Day,	140
	4000 Dollars.

Which makes £1500."

PATENT RIFLE.—We have recently examined a patent rifle of improved construction, and superior workmanship. It is an invention of our ingenious citizen, Mr. Thomas M'Carty, who has sold the right to Mr. John Lamb, of Southport. The improvement divides itself into various items; 1st, the breech and barrel are united, by a joint that is opened by means of loosing a catch, and are held together by two stirrups, one on each side of the barrel, so that the breech may be folded over against it, and thus the piece carried in a trunk or chest; 2d, it has, as appendages, any desired number of iron tubes for cartridges, which may be charged at leisure, and carried at convenience—these can be placed in the barrel at the breech and discharged at the rate of ten to a minute, with ease: these tubes are made with a cone at the lower end, that fits into a niche in the barrel and projects to receive the percussion cap already fitted on, so that the piece can be loaded and fired as fast as the joint can be loosed, and the tubes exchanged—all which may be done with ease in any position; 3d, it is easily cleaned, if it should become foul, as there is no breech-pin, and the barrel, when the tube is out, has no obstruction; 4th, its construction is simple, and its cost, to the manufacturer, can not much exceed that of ordinary, well made rifles; 5th, it is perfectly safe, as it cannot possibly be fired until every thing is ready; and it need not be carried or left with a load in it; 6th, it can be used with as much certainty in wet weather as dry; 7th, it has no incumbrance of a ramrod and its appendages; 8th, there is no drawing loads, for if a tube should miss fire, it can be instantly replaced with another; 9th, it is pretty, light, cheap and so nicely made that the joint would not be detected by ordinary inspection. The same principle is applicable to fowling pieces, *two* of which have been made. This is the only rifle of the kind that has been completed. We should think the article would find a ready market among sportsmen, prove valuable to the manufacturer, and in war be of great importance. By the use of this invention, the ordinary laborious *drill* for loading rifles and muskets would be superseded entirely.—[Elmira Republican.]

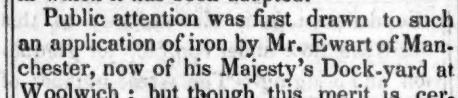
TRANSACTIONS OF INSTITUTION OF CIVIL ENGINEERS.

XXIV MEMOIR ON THE USE OF CAST IRON IN PILING, PARTICULARLY AT BRUNSWICK WHARF, BLACKWALL. BY MICHAEL A. BORTHWICK, A. INST. C. E.

A short sketch of the introduction and use of cast iron in piling, may not be considered an inappropriate accompaniment to an account of one of the most recent works in which it has been adopted.

Public attention was first drawn to such an application of iron by Mr. Ewart of Manchester, now of his Majesty's Dock-yard at Woolwich; but though this merit is certainly due to that ingenious gentleman, he had been, as it afterwards proved, anticipated in the idea by the late Mr. Mathews of Bridlington, who previously to the date of Mr. Ewart's patent, had used cast iron sheet piles in the foundations at the head of the north pier of that harbor. These piles were of different forms; the following is a cross section of one of, I believe, the most common, in which it will be seen the adjoining piles dovetail to each other, while in others, I have been informed, they merely overlap. Their length was about 8 or 9 feet, their width from 21 inches to 2 feet, and their thickness half an inch.

Mr. Matthew's plan.



Mr. Ewart's plan.

In ignorance of Mr. Matthews's proceedings, Mr. Ewart, in the beginning of 1822, took out a patent for a new method of making coffer-dams, which he proposed to effect by employing plates of cast iron, held together by cramps fitted to dovetailed edges on the piles. A section of these piles, taken from some that have been used, is shown in the accompanying sketch. A detail in the mode in which it was proposed to combine them so as to form a coffer dam might be out of place, in a paper that has reference more to the use of iron piling for permanent purposes;—the plan, as described in the specification of the patent, is to be found in the Repertory of Arts, and an abstract of it in the London Journal of Arts and Sciences for the year 1822. The length of the piles is therein stated as intended to be from 10 to 15 feet, which is, I understand, about what they have generally been made, and for cases requiring a greater depth, a mode is described of lengthening the piles, by placing one above another, and securing the horizontal joints by means of dovetailed cramps.

Though on being apprised of what had been done at Burlington, Mr. Ewart did not defend his patent, his piles have been pretty extensively adopted, particularly by Mr. Mylne, of New River Head, London, and Mr. Hartly, Liverpool. Besides other operations in the important public work under his charge, the former gentleman used the piles, soon after their invention, with complete success, in a coffer-dam of considerable size, constructed in the River Thames for the purpose of putting in a suction pipe opposite the New River Company's establishment at Broken Wharf. They have also been used with advantage by Mr. Hartley, in founding the pier heads of the basin of George's Dock, and various parts of the walls of some of the other docks at Liverpool, as also in putting in the foundations of the south river-wall.

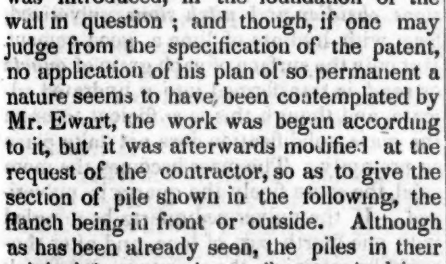
Looking at the dovetailed form of these piles, one would, I think, have been inclined to anticipate difficulty in driving them, but this does not seem to have been met with to any extent in practice, at least in coffer-dams, the original object of the invention. On this point I have pleasure in being able to quote some observations of Mr. John B. Hartley, which contain the results of the Liverpool experience:—"Considerable care," he writes, "is required in keeping the piles in a vertical position, as they are apt to shrink every blow and drive slanting. They require to be driven between two heavy balks of timber to keep them in a straight line, as they expose very little section to the blow of the ram, and are so sharp that they are easily driven out of a right line. There is another very necessary precaution to be taken, which is the keeping of the fall in the same line as the pile;—otherwise the ram descending on the pile and not striking it fairly, all parts equally, the chances are that, if in a pretty stiff stratum, the head breaks off in shivers, and the pile must be drawn, which is sometimes no easy matter." He concludes by saying, "these piles are on the whole the most useful tools you can use for their purpose (coffer-damming). I believe they have had as extensive a trial at the Liverpool Docks as any where else, and certainly with success. They have generally been driven with the

ringing or hand engine and rams of 3 or 4 cwt., a front and back pile being driven at the same time by one ram."

In the work at broken Wharf, the practice was to insert the piles and cramps all round the dam first, and drive them a moderate distance into the ground—then to pass the engine repeatedly round and send them down gradually, instead of driving them home at once; and Mr. Mylne has mentioned to me that while this was in progress, the piles being at the time but slightly driven, he was somewhat alarmed one morning at finding that the run of the water had elevated one end of the dam considerably above the other. The dovetails however held good, and proper precautions being taken, the return of the tide put all right again, without at all crippling the work, the movement having been regular all over the dam. I ought to add that these dams are still used in the works on the New River, four setts being generally kept in hand, and that the ringing engine is always employed, and the above stated method of driving followed.

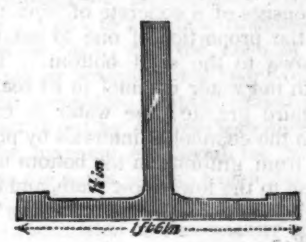
I have perhaps dwelt longer on Mr. Ewart's project than I should otherwise have done, from a feeling that from his labors has sprung much that has followed in the way of iron piling; and besides it may be observed, the remarks as to driving are not entirely limited in their application to this particular description of pile. The next work that occurs was executed by Mr. Walker, in 1824; this was the rebuilding of the return end of the quay-wall of Downes Wharf, Saint Katherine's, which had been undermined by the wash from the Hermitage entrance of the London Docks. With a view to a more effectual resistance of a like action in future, iron instead of wood sheet piling was introduced, in the foundation of the wall in question; and though, if one may judge from the specification of the patent, no application of his plan of so permanent a nature seems to have been contemplated by Mr. Ewart, the work was begun according to it, but it was afterwards modified at the request of the contractor, so as to give the section of pile shown in the following, the flanch being in front or outside. Although as has been already seen, the piles in their original form may be easily enough driven in some cases, it was found impossible to get them down in a regular line to the depth required in the present instance, through the hard material that had to be penetrated, and by which in fact they were surrounded and pressed for nearly their whole length of 14 feet.

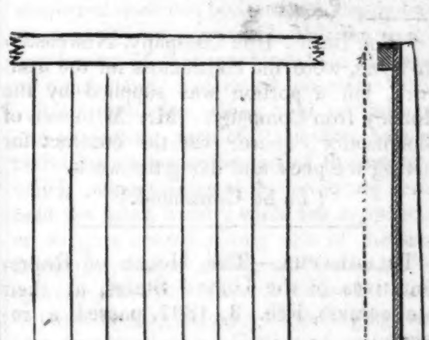
Mr. Ewart's plan modified.



Mr. Cubitt's plan.

A work on a much larger scale than any yet mentioned now presents itself,—the wharfing at the sea entrance of the Norwich and Lowestoft navigation. In this Mr. Cubitt has adopted sheet piling exclusively without the intervention of main or guide piles; the form and section will be seen by the accompanying sketches, which it is almost unnecessary to observe are not drawn to the same scale, the transverse section being considerably enlarged beyond the other two. The piles are all 30 feet long; their weight is about a ton and a half each. The back flanch which is shown at the deepest on the cross section, tapers gradually to about 6 inches at top, where the angles are blocked in to form a head for driving, and is diminished at the lower end by steps or ***sets-off*** of parallel width with square ends, instead of a straight or curving line, as the latter shape was found to have a tendency to press the pile forward, whereas by the plan adopted, it drove as fairly as if the flanch had been continued its full width to the foot of the pile. The driving was all effected by means of crab engines with monkeys about as heavy as the piles, no more fall being allowed than was necessary to send them down, and the whole is secured by land-ties, two in height, at intervals of six feet. The entire length of wharfing thus constructed is about 2,000 feet.

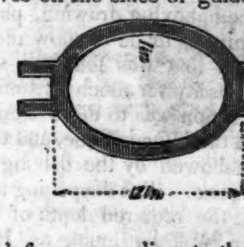




From the form of the pile, according to this plan, giving so thin an abutting surface, and the joints not being covered in any way, close and accurate driving seems essential to its efficacy, and the nature of the ground (sand mixed with shingle) would have made this a somewhat troublesome operation at Lowestoft, but for the plan that was taken to ensure precision. This consisted in riveting close to the lower end of the pile about to be driven, a pair of strong wrought iron cheeks, projecting beyond the edge about two or three inches, which clasping the pile already driven, served as a guide or groove to keep the piles flush, however thin the edge,* and the tendency to turn out or in at the heel was counteracted after a few trials by giving a greater or less bevel to the front or back face. With these appliances the piling was pretty closely driven, and the work which was completed in 1832, has been found fully to answer the object of supporting the sides of the cut from Lake Lothing to the sea against the effects of the very ingenious and powerful sluicing apparatus provided in the lock at that place.

Mr. Sibley's plan.

About a year later than the above, Mr. Sibley constructed an iron wharfing on the Lea Cut at Limehouse on an opposite principle, sheet piling being in this case altogether discarded, and the work consisting of flat plates let down in grooves on the sides of guide piles of an



elliptical form according to the section opposite, driven at distances of 10 feet. These piles are 20 feet long, weigh about 1¼ ton each, and are 9 feet apart; they are hollow throughout, to enable a passage for them to be bored in the soil by means of an augur passed through them, and so ease the driving, and are filled with concrete; each pile is land-tied, and the plates extend to within 6 feet of the point. A similar wharfing, but on a larger scale, has since been made on each side of the Thames, adjoining New London Bridge; that on the City side rather an extensive work, the piles in it being 43 feet long, (cast in two unequal lengths with a *spigot* and *faucit* joint,) of a cylindrical form, 12 inches diameter, and of metal 1½ inch thick, and each pile being secured by two tiers of ties of 2 inch square iron carried 70 or 80 feet back, to resist the great depth of filling up or backing.

The plan just described seems well enough adapted for situations where any great increase of depth is not likely to take place. The absolute depth is not so important, though where this is considerable, it may be questionable whether a heavy wharf would not be the better for the protection of a continuous row of piling at foot;—the strong land-tying necessary in the last mentioned work seems to point to this.

Brunswick wharf.

I now come to the quay wall constructed in 1833—4 by Messrs. Walker and Burges on the River Thames, in front of the East India Docks at Blackwall, and since named Brunswick Wharf. The object of this work was to afford accommodation for the largest class

* This plan has, I believe, been followed by Mr. Cubbitt in driving timber piling also, in cases requiring nicety of work.

of steam-vessels at all times of tide, for which the old quay, even had it not been in a state of decay, was not adapted from the shallowness of the water in front of it. To effect this, the first idea was to run out two or three jetties from the wharf, but this was soon abandoned, and a new river-wall resolved on; and advantage was taken of the occasion to improve the line of frontage by an extension into the river, under the sanction of the Navigation Committee of the Port of London, varying from a point at the east end to about 25 feet at the other extremity. The use of iron in the work was, I have understood, suggested by Mr. Cotton, deputy chairman at the time, and for many years an active member of the most respectable and liberal body then in the direction of the East India Dock Company, and the adoption of the proposal was facilitated by the circumstance which probably led in the first instance to its being made, namely, the low price of the material at the period, the contract being little more than £7 per ton delivered in the Thames.

In the accompanying drawing, plate No. XII, an attempt is made to show the mode of construction that was followed, so as to avoid the necessity for much written detail. The first operation was to dig a trench two yards deep in the intended line, and this was immediately followed by the driving of the timber guide piles. The deepening in front, which to give the required depth of 10 feet at low water, was as much as 12 feet, was not done until near the conclusion of the work;—to have effected it in the first instance would, without any countervailing advantage, except some saving in the driving, have been attended with the double expense of removing the ground forming the original bottom between the old and new lines of wharfing, and afterwards refilling the void so left by a material that would require time to make it of equal solidity; and even if this had been otherwise, such an attempt would have endangered the old wall, or rather would have been fatal to it. The permanent piling was next begun, the main piles being driven first at intervals of 7 feet, and the intermediate spaces or *bays* then filled in, working always from right to left, towards which the *drafts* of the sheet piles were pointed. The ground is a coarse gravel, with a stratum of hard Blackwall rock occurring in places, and some trouble was occasionally experienced from its tendency to turn the piles from the proper direction, but due attention being paid to the form of the points, the driving was on the whole effected pretty regularly, but few of the bays requiring closing piles specially made for them, so that the work may be said to be nearly *iron and iron* from end to end;—at the same time, the vertical joints of the piling being all covered, as will be noticed presently, any slight imperfection in this respect is no serious detriment to the work as a whole.

The main piles are in two pieces, the lower end of the upper one being formed so as to fit into a socket on the top of the under length, and the joining made good by means of a strong screw-bolt;—the only object of this was to insure a supply of truer castings, and lessen the difficulty of transporting such unwieldy masses from Northumberland and Staffordshire to London.* Each sheet pile is secured at the top by two bolts to the uppermost wale of the woodwork behind, and the edge of the end ones of each bay, it will be observed, pass behind the adjoining main pile, while the other joints are overlapped by the *bosses* with which all the sheet piles except the *closers* are furnished on one side. Besides adding to the perfection and security of the work by breaking the joints, so that the water, (if it penetrate, as with even the best pile-driving it will,) cannot draw the backing from its place, these projections appear to me to relieve the appearance of the otherwise too uniform face; and a like effect is produced by the horizontal fillets on the lower edges of the plates above, which also mask the joints. These plates, filling up the spaces over the sheet piling, are bolted to the main piles and to each other in the manner shown, and the joints stopped with iron cement. Where the mooring rings come, the plates are cast concave, with a hole perforated in the middle to allow a bolt to pass through, and this bolt is secured, as well as the land-ties from the main piles, to the old wharf, which was not otherwise disturbed, or to needle piles driven adjoining it. The backing consists of a concrete of lime and gravel, in the proportion of one to ten, extending down to the solid bottom. The coping with the water channel in its rear is of Devonshire granite; the water is conveyed from the channel at intervals by pipes extending from gratings in the bottom in a slanting line to the lowermost plate, and discharging themselves immediately above the sheet piling.

* The Birtley Iron Company, Newcastle-on-Tyne, were the contractors for the iron work, but a portion was supplied by the Horsley Iron Company. Mr. M'Intosh, of Bloomsbury Square, had the contract for driving the piles and fixing the work.

(To be Continued.)

TELEGRAPHS.—The House of Representatives of the United States, at their late session, Feb. 3, 1837, passed a resolve.

"That the Secretary of the Treasury be requested to report to the House of Representatives, at its next session, upon the propriety of establishing a system of telegraphs for the United States.

In compliance with this resolution, the Secretary, the Hon. Levi Woodbury, has issued a circular, with the view of obtaining information in regard to "the propriety of establishing a system of telegraphs for the United States," and invites the collectors, commanders of revenue cutters, and others to furnish the Department of State with their opinions upon the subject, especially by pointing out the manner, and the various particulars, in which the system may be rendered most useful to the Government of the United States, and the public generally. It would be desirable, to present a detailed statement as to the proper points for the location, and distance of the stations from each other, with general rules for the regulation of the system, together with an opinion as to the propriety of connecting it with any existing department of the Government, and some definite idea of the rapidity with which intelligence could, ordinarily, and, also, in urgent cases, be communicated between different places. An estimate of the probable expense of establishing and supporting telegraphs, upon the most approved system, for any given distance, during any specified period, is also desired. Information and opinions are also asked as to the practicability of uniting with a system of telegraphs for communication in clear weather and in the day time, another for communication in fogs, by cannon or otherwise, and in the night, by the same mode, or by rockets and fires, and returns are asked by the 1st of October, 1837.

As the subject is one of high importance to national and individual welfare, especially in a country of such vast extent and diversity of interests and physical features as the United States, we trust that the call of the House of Representatives and of the Hon. Secretary will meet with prompt attention and full replies.—[American Jour. of Science and Arts.]

NATURE OF DIFFERENT CEMENTS.—(Berzelius's Jahresbericht, etc. xivth. year, 1st number.)

Fuchs has studied the nature of different species of mortars, and demonstrated that their solidification depends on the formation of silicate of lime, and sometimes also of silicate of alumine. These silicates retain some water and assume the firmness of stone, whilst the hydrate of lime in excess unites by degrees with carbonic acid; and consequently solidified mortar may be considered a compound of carbonate of lime and of a zeolite. *Opal, pumice stone, obsidian* and *pitch stone* pulverized, form with hydrate of lime a good cement. But only the surface of each grain of *quartz* or *sand*, is transformed into a hydrated silicate, and though this is sufficient to unite the mass, solidification does not take place so promptly. The mass becomes the more solid, the more finely the quartz is pulverized. If the pulverized quartz be mingled with one-fourth part of lime, and after thoroughly calcining the mixture, it be pulverized and mixed with one-fifth part of lime, it forms a hydraulic cement which becomes so hard as to be susceptible of a polish. Feldspar hardens slowly, and with lime only after five months; but if calcined with a little lime it is much improved.—Common potter's clay, which is absolutely worthless in its natural state, affords with lime, when calcined, provided it contains but little iron, a cement which readily hardens.

Fuchs having discovered that *steatite*, which had been subjected to a red heat, could not be made to unite with lime, and thence concluding that magnesia has a strong affinity for silicic acid, attempted to employ calcined dolomite, in the place of ordinary lime, and found that it surpassed it, both as a material for ordinary mortar, and also for a hydraulic cement. He obtained a good mortar with this last material and calcined marl

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Fire Bricks.—Mr. Isaac Doolittle, superintendant of Iron Works at Bennington, Vermont, has, from materials found in that vicinity, manufactured fire bricks, which have stood a blast of five months, and being recently examined appeared so little worn that the furnace has again been put in blast.

This discovery appears of serious importance. We have seen specimens of the sand, which is purely siliceous—of the clay, which is of the porcelain family, and of the brick and a crucible made from these materials, all of which appear to be excellent.

In the furnaces they substitute blocks and bricks formed of these materials for fi e stones in the construction of hearths, and of tymps for blast furnaces. Heretofore hearth-stones have been obtained from Stafford, Connecticut, but these materials appear preferable to either for durability and cheapness.

Important Process.—A new process has been discovered at Strasburg, by means of which a crystallized sugar is produced in twelve hours from beet-root, and which does not require any further refining. The invention is the more curious, as neither any acids or chemical agency is employed in this remarkable operation, and the use of animal black is entirely dispensed with. It has also the advantage of saving 24 per cent. in the consumption of fuel. The new process is applicable in all the manufactories of sugar, with the execution of those upon the principle of dessication of the beet-root. The inventor is M. Edward Stohic, who, though not more than twenty-four years of age, is already highly distinguished for his experiments in chemistry and his works in p lite literature.

From the American Journal of Science and Arts.

EXPERIMENTS ON THE ADHESION OF IRON SPIKES OF VARIOUS FORMS, WHEN DRIVEN INTO DIFFERENT SPECIES OF TIMBER; BY WALTER R. JOHNSON, PROFESSOR OF MECHANICS AND NATURAL PHILOSOPHY IN THE FRANKLIN INSTITUTE, PHILADELPHIA.

In reference to railroad constructions, bridge-building, and several other useful applications in civil engineering, as well as in naval architecture, the adhesion of spikes, bolts and nails of various forms becomes an object of much practical importance. In regard to railroads, this matter is worthy of more attention than might at first sight be supposed. Owing to the high price of iron, the flat rail is often unavoidably adopted in preference to the edge rail; and whenever the speed of a train descending by gravity, or impelled with great velocity by the moving power, is to be suddenly checked by the brake, the friction of the periphery of the wheel on the rail, tends to drive the latter lengthwise, and thus to force all the spikes with which it is fastened into closer contact with the ends of the fibers which have been cut in driving them. If this partial or total dragging of the wheels along the rails take place, sometimes in one direction, and sometimes in the other, the spikes must be subjected to alternate impulses on opposite sides. Indeed, whenever the motive power depends on friction for its efficacy, as in the case of the common locomotive engine, there is a constant uccession of these two opposite dragging forces, the engine constantly tending by its driving wheels to urge the rail backwards, and the train by an equal but more extensively distributed action tending to urge forward all the rails over which it is at the same moment passing. So decided is this influence, that on a railroad where the transportation is all in one direction, and where the cars descend by gravity, I have seen rails entirely detached, or remaining loosely connected but by a single spike, while others clearly indicated by the inclined position of their upper faces or heads, that they were pressed into an oblique or leaning position in the wooden sill.

This single case may serve to show the importance of attending to the character of the spikes used in similar constructions.

To determine some of the points relating to the forms of spikes, and the kind of timber into which they are driven, the following experiments were undertaken. They serve to show the relative economy of each form of spike, as well as its fitness for the purpose intended. The mode of executing the experiments was, to drive each spike to a certain distance above its cutting edge, into the edge of a piece of plank or scantling, and by means of a suitable apparatus, adapted to that purpose, to draw it out by a direct longitudinal strain. The machine employed for this purpose was the same as that which has been used for testing the strength of iron and copper, in experiments on the tenacity of materials employed in steam boilers. A strong band or strap of iron, connected with the weighing beam of that machine, held the piece of plank, and a clamped pincers, with a suitable jaw, for taking hold of the head and projecting part of the spike, was attached to the opposite part of the machine, which being tightened by a strong screw held the spike firmly, while the application of weights upon the long arm of the lever drew the timber away, and released the spike. Care was taken to cause the strain to pass through the axis of the spike, and, by a very gradual application of weights, to avoid surpassing that force which was just sufficient for its extraction.

The first experiment was upon one of Burden's patent square spikes, with a cutting edge, intended to be in all cases placed across the grain of the timber. This spike was .375 of an inch square, and was driven into a sound plank of seasoned New-Jersey yellow pine, 3⅜ inches. The force required to extract it was 2052 lbs., and the exact weight of the part driven into the wood was 866 grains troy.

The second trial was upon a flanched, grooved and swelled spike, having the grooves between two projecting wings or flanches, on the same sides as the faces of the cutting edge. The other two sides were planes, continuing to the head. A cross section of this spike, taken 1¼ inches above its edge or point; had the form of fig. 1. At $\frac{3}{16}$ of an inch, that is, where the flanches project least from the edge, or where the swell between them comes nearest to forming a perfect square, the form is as shown in fig. 2; the dotted line *e e*, in each figure, representing the direction of the cutting edge. Towards the head of this spike, the flanching and grooving is suppressed, and the form becomes a square.

Fig. 1.

Fig. 2.

This experiment was made on the same piece of Jersey yellow pine as the first, and the weight required for extracting the spike was 1596 lbs. The weight of the part driven in was 708¼ grains. The cutting edge was irregular; the distance to which it was driven, was 3⅜ inches, as the first trial. To know the relative value of the two forms of spikes, we have but to divide the weight required for the extraction of each by the number of grains in the part which had been buried in the wood; thus, $2052 \div 866 = 2.37$, and $1596 \div 708.25 = 2.112$. Hence the plain spike had an advantage over the swelled and grooved one, in about the proportion 23 to 21. It should be mentioned also, that the plain spike was drawn out by a very gradual addition of force, whereas the force of 1596 lbs, drew the grooved spike immediately after its application. In the first trial, an attempt was made to detect any yielding or gradual retreat of the spike, before the final start, but none was observed.

The third and fourth experiments were made with the same spikes respectively as the first and second; but instead of yellow pine, the timber employed was thoroughly seasoned white oak.

The plain spike driven 3⅜ inches into that timber, required for its extraction a f rce of 3,910 lbs., and, as before, exhibited no signs of movement until the instant of starting, when it suddenly came out about one ¼ of an inch, or as far as the range of motion and the elasticity of the machine would permit.

The flanched, swelled and grooved spike, driven 3⅜ inches into another part of the same piece of plank, from which the plain one had been extracted, was drawn out with a force of 3,791 lbs. A slow motion to the extent of $\frac{1}{16}$ or $\frac{1}{20}$ of an inch was, in this trial, perceived to precede the starting of the spike; and was accompanied by a gradual protrusion of the fibres of the timber immediately around the iron. In these experiments, though the plain spike bore the greater absolute weights, yet when the weight of metal is considered, it is seen that the relative values of the two are 4.515 in the plain, and 5.354 in the grooved form. The various circumstances of the four preceding experiments are seen at a single view in the following table.

Hence it appears, that in yellow pine the grooved and swelled form was about 5 per cent. less advantageous than the plain' while in the seasoned oak the former was 18½ per cent. superior to the latter. It is apparent that the advantage of seasoned oak over seasoned yellow pine for retaining spikes, is, by a comparison of experiments 1 and 3, as 1 to 1.9; and by a comparison

TABLE I.

No. of Experiments.	Description of spike used.	Kind and condition of timber.	Breadth of spike. Inch.	Thickness of spike. Inch	Depth to which it was driven. Inch.	Weight in grains fo part driven in.	Force required to extract it in lbs. avoirdupois.	Ratio of extracting force to weight of spike.	Date.	REMARKS.
1	Burden's. plain sq. spike.	Seasoned Jersey yellow pine.	.375	.375	3.375	866	2052	2.368	1835 Oct. 27.	Force gradually applied, no motion previous to the starting.
2	Flanched, grooved and swelled.	Seasoned Jersey yellow pine.	.375	.300	3.375	708	1596	2.254	"	Force applied at once.
3	Burden's plain.	Seasoned white oak.	.375	.375	3.375	866	3910	4.515	"	Started suddenly.
4	Grooved and swelled.	Seasoned white oak.	.375	.300	3.375	708	3791	5.354	"	Fibres protruded $\frac{1}{20}$ inch before spikes drew out.

of 2 and 4, it is as 1 to 2.37. In the preceding experiments the spikes were driven into the timber and immediately drawn out again. In the second series, the spikes were driven into their respective pieces of timber, and then soaked for a few days in water. The pieces into which the different spikes were driven, were as nearly alike as it was practicable to obtain them, being always cut from the same plank, avoiding knots, cracks, &c. The following table contains a view of the experiments after soaking the timber.

TABLE II.

Timber soaked after the spikes were driven.

No. of experiments.	Kind of spike used.	Kind and condition of timber.	Breadth of spike. Inch	Thickness of spike. Inch	Depth to which it was driven. In. h	Weight in grains of the part inserted.	Force to extract the spike in lbs.	Ratio of the extracting force to the wt. of spike.	Date.
1	Swelled and grooved.	Chestnut unseasoned.	.375	.300	3.5	806.	1710.	2.121	1835 DEC. 3
2	"	Yellow pine seasoned.	.375	.300	3.5	806.	1668.	2.069	"
3	"	Hemlock partly seasoned.	.375	.300	3.5	806.	1738.	2.156	"
4	"	White oak seasoned.	.375	.300	3.5	806.	3373.	4.184	"
5	"	Locust partly seasoned.	.375	.300	3.5	806.	4902.	6.081	"
6	Swelled and grooved, the swell filed away.	Chestnut unseasoned.	.390	.300	3.5	759.	1852.5	2.440	"
7	"	Seasoned yellow pine.	.390	.300	3.5	759.	1767.	2.328	"
8	"	Hemlock partly seasoned.	.390	.300	3.5	759.	1296.8	1.576	"
9	Plain spike, filed lengthwise.	Chestnut unseasoned.	.400	.394	3.625	933.5	1790.	1.810	"
10	"	Hemlock partly seasoned.	.400	.394	3.5	933.5	1638.75	1.755	"
11	"	Locust partly seasoned.	.400	.394	3·5	933.5	3990.	4.167	"
12	"	"	.400	.394	3.5	933.5	4332.	4.640	"
13	Grooved and notched, or serrated.	White oak.	.392	.315	3.675	759.	2622.	3,454	"
14	Burdens's patent.	"	.339	.329	3.625	639.	2152.	3.367	"

REMARKS.

Experiment No. 1.—In this and the four following, the thickness of the spike is that at the bottom of the grooves.

Experiment No. 4.—The oak used in this experiment was firmer than that employed in the first series.

Experiment No. 5.—The timber had been slightly split by the driving of this spike.

Experiment No. 6.—The flanches remained after filing out the swelled part of the original form.

Experiment No. 12.—Timber slightly split in driving the spike.

The first five of the preceding experiments show that with a spike of given form and driven a certain distance into different timbers, the order of retentiveness, beginning with the highest, is as follows: 1, locust; 2, white oak; 3, hemlock; 4, unseasoned chestnut; 5, yellow pine. From the 6th, 7th, and 8th experiments, we see that chestnut is still above yellow pine, but that hemlock is inferior to both. By the 9th and 10th, it also appears that hemlock is still to be placed below chestnut. Comparing the 1st experiment in this table with the 6th, and the 2nd with the 7th, we perceive that the swell towards the point of the spike, was so far from being an advantage to it, that it in fact rendered the spike less retentive than when that swelled part had been removed; so that, even could this form have been produced without any increase in the weight of the spike, it would still have been less advantageous than the simple groove without the swell; but when it is considered that the swell added 47 grs. (=806 − 759) to the weight, it is evident that the groove alone has a decided advantage over the other form. By the trials in unseasoned chestnut, (Nos. 1 and 6.) this advantage is 15 per cent.: thus $\frac{2440-2121}{2121}=15$; and by those on yel. pine, (Nos. 2 and 7,) it is $\frac{2328-2069}{2069}$ =12.5 per cent. In fact, after the ends of the fibres have once been thrust apart by the thick part of the swell, it is evident that when they come opposite to the cavity above the swell they must lose some portion of their power to press the spike and produce the retaining force of friction; this force must then depend for its production on the action of those fibres of the wood which are opposite to the swelled portion, or between it and the point of the spikes.

In the next series of experiments, it was attempted to ascertain the relation between forms more diversified than had hitherto been employed.

As it is evident that the total retentiveness of the wood must depend, in a considerable degree, upon the number of fibres which are longitudinally compressed by the spike, it was inferred, that on the area of the two faces, which in driving the spike are placed against the ends of the fibres, must in a great measure depend the retention of the spike. In this series, four kinds of wood and ten forms of spikes were employed.

A comparison of the results given in the

following table, will show what order those forms would possess among themselves, in point of retentiveness, as well as the advantages of the respective species of timber into which they were severally driven.

TABLE III.

Spikes of various forms—timber of different kinds.

No. of Experiments.	Kind of spike used.	Kind and condition of timber.	Breadth of spike. Inch.	Thickness of spike. Inch	Area of two faces. Sq. in.	Depth to which driven. Inch.	Weight of part inserted. Grs.	Force to extract spike. Lbs.	Ratio of force to weight of spike.	Date.
1	Straight square.	Chestnut unseaso'd	.405	.402	2.83	3.5	942	1995	2.116	1835. Dec. 4.
2	Burden's patent.	"	.373	.384	2.64	3.5	866	1873	2.162	Dec. 8.
3	Broad flat.	"	.539	.288	3.77	3.5	898	2394	2.663	Dec. 4.
4	Narrow flat.	"	.390	.253	2.73	3.5	566	2223	3.927	Dec. 8.
5	Straight square.	White oak thoroug'ly seasoned.	.405	.402	2.83	3.5	942	3990	4.129	Dec. 7.
6	Broad flat.	"	.539	.288	3.77	3.5	898	5130	5.712	"
7	Narrow flat.	"	.390	.253	2.73	3.5	566	3990	7.049	"
8	Burden's patent.	"	.373	.384	2.64	3.5	866	3905	4.509	"
9	Cylindrical with cutting edge.	"	.485	Diam.		3.5	1211	3876	3.200	"
10	Grooved and swelled.	"	.375	.375	2.60	3.5	806	3727	4.624	"
11	Grooved but not swelled.	"	.375	.375	.260	3.5	759	4247	5.662	"
12	Grooved, and bottom of grooves serrated.	"	.375	.375	.260	2.5	500	2650	5.300	"
13	Square.	Locust seasoned 3 years	.405	.402	2.83	3.5	942	5967	6.334	Dec. 8.
14	Broad flat.	"	.539	.285	3.77	3.5	898	7040	7.839	"
15	Narrow flat.	"	.390	.253	2.73	3.5	566	5273	9.316	"
16	Cylindrical, pointed with 15 grooves filed longitudinally from the point upward.	Ash seasoned.	.500	Diam.		3.5	929	2052	2.208	1836. Jan. 4.
17	"	"	.500	"		3.5	929	2309	2.507	"
18	Plain cylindrical, pointed, scale not removed.	"	.500	"		3.5	1015	2451	2.414	"

REMARKS.

Experiment No. 10.—The measure in this and the two following cases were taken outside the flanches.

Experiment No. 12.—The weight of the part inserted is given by estimation in this experiment.

Experiment No. 16.—In this and the two following experiments, the spikes were driven into the timber in the direction of the length of the fibres.

The above table furnishes three sets of comparisons for deducing the relative retaining powers of green chestnut, thoroughly seasoned oak, and equally seasoned locust. Thus the weight which in those three cases drew the square spike from chestnut, was 1995; and that which extracted the broad flat one 2394; and that which drew the narrow flat one from the same timber was 2223. The sum of these is 6612. The sum of the three numbers for the same three spikes used with oak, was by experiments 5, 6, and 7, 13110; and the sum of the three locust, by experiments 13, 14, and 15, is 18280; these three numbers have to each other the relation of 1, 2, and 2⅔; from which we infer that oak is almost precisely *twice*, and locust 2⅔ times as retentive as unseasoned chestnut. By comparing together the results of experiments 1 and 2, it will be seen that the weights required for extracting the two spikes respectively, are more nearly proportional to the breadth than to either the thicknesses, or the weights of the spikes. For the spike with a breadth of .405 inch and a thickness of .402, required 1995 lbs. for its removal, while that which had a breadth of .375 inch took 1873 lbs. Now .373 : 405 : : 1073 : 2033 for the calculated retentiveness, instead of 1995, as given by experiments;—a difference of only + 38 lbs. between the observed and calculated results. Calculating the retention by the *weights* of the respective spikes, we should have 866 : 942 : : 1873 : 2987, or a difference of 42 lbs. while using the thickness alone, we obtain .384 : 402 : : 1873 : 1960, a difference of an opposite kind of 35 lbs. from the observed result, the greater thickness yielding the less retentive power. This correspondence between the breadths and the extracting weights becomes still more apparent when we compare the third, and especially the fourth with the second experiment. Thus for the broad flat spike, (3d Ex.)—compared with experiment 2, we obtain

By breadths, .373 : 539 : : 1873 : 2701, instead of 2394, diff. + 307
" weights, .866 : 898 : : 1873 : 1942, " " " —452
" thicknesses, .384 : 288 : : 1873 : 1379, " " " —1015

and for the thinner and lighter spike, (Ex. 4th.)—compared with the same,

By breadths, .373 : 390 : : 1873 : 1958, instead of 2223, observed diff. —[illegible]
" weights, .866 : 566 : : 1873 : 1224, " " " " —[illegible]
" thicknesses, .384 : 253 : : 1873 : 1234, " " " " —[illegible]

Nearly the same conclusions would result from a comparison of those trials, which were made on seasoned white oak and locust. Indeed, it appears that with a given breadth on the face of the spike, a diminution of thickness is sometimes a positive advantage to the retentiveness of the timber; for in white oak, the spike which had a breadth of only .390, required as much force to extract it, as one of which the breadth was .405, though the thickness of the former was but .253, while that of the latter was .402; and on chestnut, the thinner, narrower, and lighter spike, required absolutely more force to withdraw it than the other. This leads us to notice the different kinds of action of the respective spikes on timber of various kinds. In the softer and more spongy kinds of wood, the fibres instead of being forced backed longitudinally and condensed upon themselves, are, by driving a thick, and especially a rather obtusely pointed spike, folded in masses backward and downward so as to leave in certain parts the *faces* of the grains of the timber in contact with the surface of the metal.

That the view just presented is correct, seems also probable from what was observed in the case of the swelled spike. For while the grooved but unswelled one, driven into chestnut timber, (table II. Ex. 6,) required 1852 lbs. to extract it, the grooved and swelled spike, (Ex. 1, same table,) took but 1710 lbs. And in table III. Ex. 11, we find the swelled spike drawn from white oak by 3727 lbs. and the grooved but not swelled one, Ex. 12, requiring 4247. Hence it appears to be necessary, in order to obtain the greatest effect, that the fibres of the wood should press the face as nearly as possible in their longitudinal direction and with equal intensities throughout the whole length of the spike. Arranging the spikes according to the order of their ratios of retention to weight, as given by the experiments in table III, from five to twelve inclusive, we have the following:

1. Narrow flat spike, with a ratio of 7.049
2. Wide, " " " " " 5.712
3. Grooved but not swelled, " " 5.662
4. Grooved and notched, " " 5.300
5. Grooved and swelled, " " 4.624

6. Burden's patent, " " 4.509
7. Square hammered, " " 4.129
8. Plain cylindrical, " " 3.20

Experiments 16, 17, and 18, of the same table were made by driving the spikes which were cylindrical with conical points into the timber endwise of the grain. This method of comparing two forms, the one grooved and the other plain, was adopted on account of the extreme liability of the timber to be split by driving spikes of these forms *across* the direction of the fibres. It was observed that on drawing these spikes, the holes were almost perfectly square. This resulted from the position of the rings of annual growth and the greater elasticity in some directions than in others. It is probable that if the filed grooves in experiments 16 and 17 had been covered with a scale of oxide, as was the case with the plain spike used in experiment 18, the former would have given a result somewhat higher.

When holes are drilled into stone blocks and afterwards plugged with timber to receive spikes in fastening on the chairs of edge rails, the method of experimenting just described finds an application, and it is probable that in such cases the grooved cylinder with a conical grooved point, may prove advantageous.

A few experiments were made to determine the effect of driving to different depths, on the total amount of retention. For this purpose two different spikes were selected, viz., the square hand-wrought spike, the section of which was .405 × .402, and the wide flat one of which the section was .539 × .288. They were respectively driven to a certain depth into unseasoned chestnut, and then subjected to a force just sufficient to start them. This force was noted, and the spike was immediately driven down one inch deeper than before, and the force again applied. All my experiments proved that when a spike is once started, the force required for its final extraction is much less than that which produced the first movement. This is readily accounted for on the principle that as the wedge-shaped point was from half an inch to an inch in length; and as this, on the starting back of the spike a very little distance, became mostly relieved from the pressure of the fibres, all that part of the retention which had been due to the wedge-shaped portion of the spike was at once destroyed. The following table will show, however, that the mere starting of the spike with parallel faces does not essentially diminish the retention, when again driven into the timber to a greater depth than before. But when a bar of iron is spiked upon wood, if the spike be driven down until the bar compresses the wood to a great degree, the recoil of the latter may become so great as to start back the spike a short distance after the last blow has been given. In this case a great diminution in the useful effect will be the consequence. This shows that a limit may exist to the force which we should apply in urgigg down spikes or bolts destined to fasten materials together.

TABLE IV.

Spikes driven to different depths.

No. of the Experiment.	Form of spike.	Kind and condition of timber.	Breadth of spike.	Thickness of spike.	Area of the two faces pressing the ends of the fibres. Sq. in.	Depth to which spike was driven. Inches.	Weight of the part inserted. Grs.	Force to extract the spike.	Ratio of force to weight of spike.	Date.
1	square not filed.	chestnut unseasoned.	.405	.402	.7695	1.9	483	1183	2.428	1835. Dec. 4.
2	" " "	"	"	"	1.1745	2.9	789	1995	2.528	"
3	" " "	"	"	"	1.5795	3.9	1095	2565	2.342	"
4	Broad flat.	"	.539	.288	.9702	1.8	442	1525	3.457	"
5	" "	"	"	"	1.5092	2.8	745	2594	3.482	"

By comparing experiments 1 and 4 together, it will be found that weight for weight the flat spike had when driven 1.8 inches, an advantage of 42.3 per cent. over the square one; and by a like comparison of experiments 2 and 5, it is evident the former had a superiority of 37.7 per cent. As the spike when driven in only 1.9 inches had a much less proportion of its parallel faces exposed to the reaction of the fibres and a greater proportion of the wedge-shaped point, it is reasonable to expect that the retention would not correspond precisely with the lengths inserted. It will be understood that when we speak of *cutting edges* and the wedge-shaped portion of spikes, whether square, flat, or cylindrical, the direction of the cutting edges is always across the fibre or grain of the timber. It must be evident that the wedge-shaped part may be so acute, as to correspond nearly with two parallel faces, in which case, the tendency to retreat from the lateral pressures is small; and the pressures themselves, increasing from the point upwards to where the spike is thickest, the total efficiency of a given length may be as great as that of an equal length of the parallel faces, and even greater, provided the thickness of the spike be so considerable as in driving it to produce much crushing and irregular folding of the fibres of the timber. If, on the other hand, the edge be very blunt, the tendency to recoil may be such as to diminish the adhesion, and in this case the effect of the wedge shape is negative. In the other it may be positive.*

The *first*, *second* and *third* experiments indicate, in the tenth column of the preceding table, that beyond a certain limit the ratio of *weight of metal* to extracting force begins to diminish, showing that it would be more economical to increase the number rather than the length of the spikes, for producing a given effect in fastening materials together. In this case, also, it will be perceived, that the adhesion has a much closer relation to the areas of the compressing faces of the spikes, than to their weights. For three of the experiments this ratio may be regarded as identical, and dividing, for each of the five experiments, the observed retention by the area of the two faces opposed to the ends of the fibres, we get a mean result, which proves that the absolute retaining power of unseasoned chestnut, on square or flat spikes of from 1.8 to 3.9 inches in length, is about 813 lbs. for every square inch of those faces which condense longitudinally the fibres of the timber.

* The following formula may represent the several experiments; $R = lf \pm c$, in which R is the observed retention; l = the length in inches of the part inserted; f = the force of retention on one inch of the parallel faces, and c = the differences between the retention of a parallel portion of the spike, and of an equal length of the converging faces near the point. The sign of ambiguity arises from the cause above explained.

Agriculture, &c.

Prejudice and conceit are the offsprings of ignorance, and the great barrier to agricultural improvement. An African prince threatened to take the life of a traveller, because he dared to assure him, that water became solid by freezing, in his country. Because he had not seen it, the prince deemed the traveller an impostor and a liar. A few years ago, the growth of a hundred bushels of corn on an acre was considered a fabulous tale by the mass of the farmers. They had not seen such a product, and they therefore did not believe in it. But such a product is now of so common occurrence, that few doubts its reality. Tell these men that they can double the products of their farms, by economizing and judiciously applying their manure;—that they can quadruple it, by this, by underdraining, by alternating crops, and by root culture—and they are as incredulous as the African prince, because they are ignorant of those natural laws which ever have governed the material world, and which ever will govern it. The savage laughs at and rejects the art of civilized life, for the same reason that the ignorant or indolent farmer scouts the idea of improving the condition of society by agricultural societies, agricultural schools and legislative bounties for agricultural improvement.—

They either do not know enough of natural science, to comprehend its utility in the ordinary business of life, or they are governed by a sordid, selfish, illiberal policy, which, could it be carried out, would shut out every ray of light, and smother every sentiment of patriotism, which should either thwart their views, or which would tend to elevate their fellows above their own limited standard in society. Some men seem to have an idea, that they are balanced in a scale; that as others can be made to sink, in the same proportion they shall rise, and vice versa. The first requisite to improvement, in any business, is the conviction, that we *can* learn; the next, that we *will* learn. And it perhaps is invariably true, that the more we *do* learn in useful knowledge, the more we become sensible of our comparative ignorance, and the more we are anxious to learn. This results not only from a wish to serve ourselves, and multiply our enjoyments, but from a sense of sacred duty to society.

Our national motto once was, "*millions or defence, but not a cent for tribute.*" A correspondent suggests the following parody, as suited to the action of the legislature upon the surplus fund:—"*Millions for the professions, but not a cent for the arts of productive labor.*"

If it is true, as is alleged, that some farmers in our legislature, are averse to giving any public monies to aid agricultural improvement, we do not hesitate to say the sentiment is unworthy of them; and that enlightened men will be apt to charge them with either ignorance or jealousy—ignorance of the value of rural improvement, and of their duty—or jealousy lest others may be enabled to surpass them—and their own profits and popularity be consequently lessened.

THE CONTRAST.—Massachusetts gives nothing from her public treasury to sustain her common schools, but she gives bountifully from her public treasury to sustain and encourage her agricultural socities, and is now about making an *agricultural* survey of her territory. Her schools are surpassed by none in the Union. New-York has given millions to her colleges, and millions to her common schools; but she clenches her purse with a convulsive gripe when she is asked to aid and encourage agricultural societies. If it is true, that wisdom lies between two extremes, these States might learn from each other.

FARMING IMPLEMENTS.—The State Agricultural Society have appointed a board of examiners, comprising men of science, and practical machinists and farmers, to meet semi-annually, to examine, and thoroughly to test (and to give certificates of merit,) all farm implements and machinery which may be offered for their inpection. We are glad to learn, that the gentlemen designated will attend to the duties of their appointment, and that notice will shortly be given of the time and place of their first meeting. This measure, if properly carried out, and we feel confident that it will be, cannot fail of producing a highly salutary influence upon our agriculture, and upon the general interest of the State. It will give general confidence in implements and machines which are truly meritorious, and to multiply them upon our farms; while on the other hand, it will tend to prevent imposture, and to save great expenditures for inventions which are comparatively worthless.

BROOKS' SILK SPINNER AND TWISTER, deserves a further notice from our hands, because we think it ranks among the most useful improvements of the day, and is calculated greatly to facilitate our progress in the silk business. Let it be remembered, that very little instruction is required to qualify a woman to use it; that it is equally adapted to the fabrication of sewing silk, twist, or to a thread for any required fabric, and that it produces all these, as far as we can judge, in a perfect manner. Now the question is, what will it earn, in a silk family, or a silk neighborhood? For now-a-days, *profit* is the great desideratum. In this matter, we shall speak on the authority of the patentee, a very unassuming, intelligent, and, we believe, honest member of the society of Friends, or Quakers. He says it is a moderate day's work to spin and twist half a bushel of cocoons into sewing silk, and that the fair average product of these cocoons would be 175 skeins of sewing silk, worth now, at wholesale price five cents the skein. The highest price of cocoons is $4 per bushel. Assuming these data, and basing our calculation upon five bushels of cocoons, which a family of girls may easily produce every year, let us see what would be the gain which would accrue to this family in five years, from the are of this machine.

The 25 bushels of cocoons would produce 8,750 skeins silk, worth five cents at wholesale,		$437 50
From which deduct the wages of a woman, 50 days, at 50 cents,	$25 00	
Add cost of machine,	35 00	
And it makes a total of		60 00
And leaves a profit of		$377 50
The highest price at which cocoons sell is $4 which would be for the 25 bushels,		100 00
		$277 50

Which shows a profit, in buying and using this machine, over selling the cocoons, in the small quantity of 25 bushels, of $277 50. This would require the labor of a women only ten days in a year, or fifty days in the five years. The remainder of the time, to any extent required, might be as profitably applied, in working-up the cocoons of the neighborhood, of the town, or of the county; and the value of the machine would be yet but little impaired by these earnings! Every silk district should have one of Brooks' machines.

IMPORTANT REQUISITES IN A WIFE.

A knowledge of domestic duties is beyond all price to a woman. Every one of our sex ought to know how to sew, and knit and mend, and cook, and superintend a household. In every situation of life, high or low, this sort of knowledge is of great advantage. There is no necessity that the gaining of such information should interfere with intellectual acquirement, or even elegant accomplishment. A well regulated mind can find time to attend to all. When a girl is nine or ten years old, she should be accustomed to take some regular share in household duties, and to feel responsible for the manner in which her part is performed; such as her own mending, washing the cups and putting them in place, cleaning silver, or dusting and arranging the parlor. This should not be done occasionally, and neglected when ever she finds it convenient—she should consider it her department.—When older than twelve, girls should begin to take turns in superintending the household—making puddings, pies, cakes, &c. To learn effectually—they should actually do these things themselves, and stand by, and see others do them.—[Mrs. Child.]

A HEALTHFUL RECREATION.

Among the pleasant employments which seem peculiarly congenial to our sex, the culture of flowers stands conspicuous. The general superintendence of a garden has been repeatedly found favorable to health, by leading to frequent exercise in the open air, and that communing with nature which is equally refreshing to the heart. It was laboring with her own hands in her garden, that the mother of Washington was found by the youthful Marquis La Fayette, when he sought her blessing as he was about to commit himself to the ocean, and return to his native clime. The tending of flowers has ever appeared to me a fitting care for the young and beautiful. They then dwell as it were, among their own emblems, and many a voice of wisdom breathes on the ear from those brief blossoms, to which they apportion the dew and the sun-beam.—[Mrs. Sigourney.]

From the Quarterly Journal of Agriculture.

STUDIES IN THE SCIENCE AND PRACTICE OF AGRICULTURE, AS CONNECTED WITH PHYSICS.

(Continued from page 419.)

Nutritive Principles of the Food of Plants.—It is stated in most elementary books, that the chief food of plants consists of carbonic acid gas diffused in water, together with potass and some other matters apparently not well understood. But a plain agriculturist not acquainted with science will very naturally ask how this is proved. By burning plants, indeed, he knows that charcoal (*carbon*) and potass may be produced; but in that case these are in a very different state from the one in which they exist in the growing plant. M. Lassaigne, the able Professor of Chemistry at Alfort, devised the ingenious experiment of analyzing the chemical constituents of seeds before and after germinating, and in this way arrived at one method of proof of the facts just stated; yet the plain farmer who might have witnessed such analysis would readily make a similar objection to it with that of procuring charcoal and potass by burning, namely, that it was an artificial process, and therefore calculated to

change the state of the substances discovered.

In order to elucidate these points, confessedly difficult and obscure, M. Biot undertook the investigation, by applying his newly discovered and powerful test of the rotary polarization of light. Before giving any details of M. Biot's experiments, however, it may be well to state the views of M. Raspail respecting the imbibition and flow of the sap, these being rather novel as well as probable.

Circulation of the Sap.—All growing vegetable textures are composed of cells, every where closed, containing a fluid, which is in continual motion so long as the temperature is above 32° Fahr. The cells adhere to one another, or rather are fixed to one another by a sort of root or pedicle (*hilum,*) often too minute for observation; and it is this, and the globules of the cell, which being lengthened out and expanded in the progress of growth, give origin to new parts, or to the enlargement of old ones.

The circulation of the fluid in the cells, originally discovered by Corti in the *Chara*, cannot be observed when the cells are opaque or the fluid transparent; but an idea may be formed of it by filling a tube with spirits of wine, having some raspings of cork in it, and holding it in the hand, when the heat of the hand will cause a current to rise from the bottom up one side of the tube, and the cold at the top abstracting the heat from the particles as they rise, will cause an opposite current to descend on the other side. The difference of the vegetable circulation from this experimental one, consists in its being caused by a living principle, and not heat, though a certain temperature is indispensable. M. Raspail terms the operation of this principle in circulating the sap, *aspiration* (meaning by this something like suction or attraction,) and *expiration* (meaning something like expulsion or repulsion,) the sides of all the cells of growing plants alternately aspiring and expiring, or attracting and repelling fluids.

The membranes of plants, as well as the cells composing them, aspire and expire fluids; and when these membranes form a tube with branches more or less composed of net-work or reticulations, the fluid forms one continuous current in every part of the tube.

The stems and branches of all plants are formed of cells, which, from having been originally globular, expand by growth; and by the pressure of other cells expanding around them, take a wedge like shape, the thin portion forming their point of attachment or pedicle (*hilum.*) The membranes thus formed may be conceived to sheath each other, the inner sheaths being inserted by their wedge-point (*hilum*) into the sides of the outer ones. These mutually sheathing membranes besides are traversed both across and lengthways by a net-work of vascular canals, and consequently the fluid transmitted by each wedge point must necessarily rise along the side next to the part above the wedge-point, falling down the opposite side, and again rising along the part below the wedge-point, or the contrary. At the same time a portion of the fluid is transmitted to the wedge-point of the next enclosed sheathing membrane, where the circulation will take a similar direction.

The flow of the sap from the cut ends of a plant may thus be explained; for on each cut surface there will be alternately one-half of a sheathing membrane, the fluid in which was rising up, and another half in which it was falling down.

The branches are always inserted by the wedge-points (*hila*) of their component sheathing membranes into the trunk or stem, and, consequently, the circulation of the fluid at the junction is the same as that just explained.

The sheathing membranes of the root, it must be remarked, do not terminate in the outer sheathing membrane or burso of the stem, but penetrate to one of the inner ones, and hence the rising sap, as yet not organized, is conveyed to an inner sheath.

The strong attractive power of the tips of the root fibres, through which alone the liquid food of plants is transmitted, may be seen when roots have been forced to grow between stones; for the tips will be found to adhere more or less firmly to the stones, while the other parts of the root are loose and free. In the same way particles of earth will generally be found adhering to the tips of the root-fibres, having been attracted by the suction or aspiration of the spongiole. (*Chimie Organique*, 811, &c.)

Changes in the Sap.—The preceding are the views of M. Raspail, which further researches may either confirm or refute. The following are a small portion of the interesting experiments and observations of M. Biot on the sap and its changes, and these, it may be remarked, wear more the air of fact, and look less theoretical, than Raspail's statements.

M. Biot first proposed to himself to ascertain, by means of circular polarization, the presence of the gummy or saccharine principles in the sap of trees, and to trace these principles as connected with the nourishment of the young buds in spring. Some of the facts which he discovered were very remarkable.

He pierced with holes, sloping slightly downwards, several species of trees, early in February,—the almond, the birch, the hornbeam, the maple, the ash, the lilac, the mulberry, the walnut, the elm, the poplar, the plane, the willow, the elder, the sycamore, the lime, and the vine,—fitting into each hole a dry reed, with the inserted extremity cut sloping, and scarcely penetrating deeper than the bark. The other extremity entered a small phial, suspended by a bit of wire, and luted with a mixture of oil and wax, immiscible in water. The flowing sap was collected in these phials, and when any evaporation of the water portion occurred from the temperature of the tree being higher than the air, it was condensed within the phial. He was not contented with experimenting on one tree of a species, but selected several of the same sort in various positions and exposures; and he also fixed on the same tree a considerable number of phials, at various heights from the ground.

In the birch he both discovered that the sugar in the sap is not cane but grape sugar, and also that the sap actually flows progressively from the root to the summit, the flow varying with exterior physical causes, which serve to modify it. The walnut, the sycamore, and the maple, did not in February show any flow of sap; and M. Biot took advantage of their state of rest to examine their interior by having a number of trees of these species cut down on purpose. It was remarkable that the interior of the birch trees was found to be without moisture, and even quite dry, while the walnut and sycamore trees were distinctly soaked (*imbibe*) with moisture from the inner surface of the bark to near the central pit. On being pressed, also, the moisture could be squeezed out, and the oozing was most distinct between each of the circles constituting the annual rings of wood. All this was observed while there was no flow from the reeds into the phials except in the birch.

The walnut trees began to give a few drops about the 11th of February, in the phials placed about seven inches from the ground. The sap thus collected was not fermentable grape-sugar, like that of the birch, but crystallizable cane-sugar, for it gave a strong polarization towards the right, while that of the birch was towards the left. The run into this lower phial, after continuing abundant for several days, began to diminish towards the end of February, and at length it ceased altogether. The phial immediately above it, about a yard from the ground, also gave a very small quantity, while all the other phials on the same tree, to the number of eighteen, remained quite dry.

What appeared most singular was, that this individual walnut-tree was known to be rather a late one, while another very large one, at a hundred paces distant, known to be about fifteen days earlier, gave no trace of sap in fifteen phials which M. Biot had attached to it. He began, accordingly, to suppose that this early walnut, as well as the sycamores and maples, had been pierced too late, and that the spring flow of their sap was over; or rather that, in the then state of the atmosphere, they evaporated as much sap as they received from their roots. The flow, of course, would not again take place unless the evaporation should be checked by the occurrence of cold weather. This actually did occur, the thermometer falling to one degree below zero, followed by a sharp dry frost, when the maple, sycamore, and walnut trees began to flow, continuing thus till the 16th of March, when the flow began to diminish. M. Biot says, the effect of the cold on the birch tree was very different, but gives no details.

M. Biot distinctly proved that the sap near the root is less dense, and less rich in saccharine matter, than higher up in the trunk or branches, a fact previously stated by Mr. T. A. Knight, but explained by him to arise from the sap in spring mingling with the condensed nutriment deposited in the roots the preceding autumn. M. Biot thinks differently, believing it to arise from the watery portion of the sap being in its ascent either diffused through the cellular substance, or evaporated, or both; and he proved, that though the sap collected in the phials at different heights from the same tree was more dense and rich the higher it was procured, the portions of wood and bark containing the sap gave exactly the same proportions of

saccharine or nutritive matter at all heights. M. Biot farther discovered, that the swelling and opening buds (at least of the lilac) have the power of decomposing the sugar of the sap, and of appropriating the carbon contained in it, in the same way as he proved the seed-leaves of corn to decompose the feculla contained in the grain, and change its dextrine into the sugar which nourishes them.

Observations on the Growth and Nutrition of Corn.—M. Biot, finding that the slow growth of trees was not so well adapted to some of his experiments as the quick growth of annual plants, made choice of wheat and rye for observation. It has long been known to physiologists, that, in the process of germination, the farinaceous matter (now known to consist of globules of dextrine in their envelopes) is changed into sugar, which serves for the nourishment of the young plant up to the period when its seed-leaves and primary roots make their appearance. But when the supply of nourishment contained in the seed has been exhausted, the young plant must depend on other sources to maintain its growth; and hitherto it had not been experimentally determined what these other sources of nourishment really are, what modifications they undergo in the various parts of the plant, nor in what manner the different portions are transmitted to the nascent seed in the ear to nourish and mature it.

It is important, in all such inquiries, to distinguish the solid parts, which constitute the frame-work of the plant, from juices or soluble materials, which, constantly formed, destroyed, and renewed, are carried into all the vegetable texture for its nourishment. The first, or solid materials, can be examined by chemical analysis after a plant is dead and dried, but it is different with the other parts or liquids examined by M. Biot.

Rye.—He made his first observations, the 3d of May, on plants of rye already in the ear, but not yet in bloom, the period of blooming being still at some distance. He treated the roots, the stems, and the ears, each separately, with water, submitting them to the proofs of circular polarization, and then he treated the watery extracts, condensed but not to dryness, with spirits of wine; submitting to the proofs of polarization the precipitates as well as the substances not precipitated from the liquids. In a word, he tried, by adding to each the yeast of beer, whether they were susceptible of fermentation, again examining whether their rotation was diminished, increased, or changed in direction.

The matter from the roots gave traces of an exceedingly feeble rotation towards the left, but when it was observed, M. Biot had not discovered that a mixture of cane and grape-sugar would, in a manner, neutralize the right and left rotation. The stem indicated a proportion of grape-sugar turning to the left, and of cane-sugar turning to the right, as well as gum precipitated by spirits of wine, and turning to the left with a force similar to gum. Twelve days afterwards, the 15th of May, while the ear was still far from blooming, the stem presented a mixture of the three substances, but with a considerably larger proportion of cane-sugar, proved by rotation towards the right before being fermented.

The matter from the ear on the 3d of May, and before blooming, gave very different results from the matter of the stem; for M. Biot could not detect it in any sugar, either grape or cane, but only sugar of starch, of which fermentation enfeebled the circular power without changing its direction. The precipitates also formed by spirits of wine, instead of having the characters of gum as those of the stem, showed only flakes similar to the envelopes of dextrine in the mature grain. These results accord with the observations of M. Raspail, who ascertained that, before blooming, the grains of fecula in corn are extremely small, and that their soluble matter is gradually absorbed by the seed organ (*ovarium,*) which it serves to nourish. M. Biot, as yet, found no dextrine.

After blooming, the composition of the ear was found to be very different. The 15th of June, the young grains of rye taken from the ear, already contained globules of fecula containing dextrine, along with some sugar of starch, but no trace of cane nor grape sugar. It follows, M. Biot infers, that the cane-sugar, the grape-sugar, the gum, which are contained in the stem and leaves of rye, are changed in their nature on passing the neck of the ear (*le collet des epis*), supplying materials for nourishing the young grain, which forms it into dextrine and its envelopes.

Wheat.—In his observations on wheat, M. Biot was more particular than in the case of the rye to keep separate the different parts of the plant, and, in consequence, discovered differences of composition, which he could not have beforehand imagined.

The 19th of May, he took young plants of wheat whose ears had not issued from their sheath or hose, he carefully separated the sheathing leaves from the cylindrical stem, and treated the two separately with water, alcohol, and fermentation.—The stems like those of rye presented three carbonaceous substances, namely, grape sugar, cane-sugar, and gum; but subsequent observation showed, that the proportions of these three substances varied much during the progress of vegetation. The 20th of May, the cane-sugar evidently predominated; but the 4th of June, when the ears began to bloom, the stems gave a rotation towards the left, and afterwards preserved this rotation, showing that the cane-sugar had become much less abundant *in the stem.*

The leaves gave very different results; for though they contained three substances the cane-sugar was proportionably much greater than the grape sugar, the contrary of what was found in the stem; and instead of the third substance being gum turning to the left, it produced a rotation towards the right, appearing in fact to be dextrine. The leaves of wheat continue to preserve the same composition till they begin to grow yellow and wither, an effect that uniformly commences at the tip of a leaf, and on the leaf nearest the root; but after this, scarcely a trace of sugar or dextrine can be found in them, all, it would appear, having gradually passed into the stem to nourish the ear, in the same way as the carbonaceous materials of the leaves of trees descend under the layers of the inner bark and pulp wood (*alburnum,*) to nourish the young cylinder of wood and bark, which, similar to a hollow stem of wheat, is annually formed, and moulds itself upon the old frame-work of the wood.

In wheat, therefore, as well as in rye, the base of the stems can derive nourishment partly from the leaves and partly from the soil, and the summit of the stem can draw nourishment from its own leaves, as well as suck up the sap from below; but the ear, when it issues from the sheath appears to exercise on the proper juices of the top of the plant a powerful absorption, causing them to rise rapidly in proportion as they are furnished by the base of the stem.

The 4th June, M. Biot took plants of wheat in full bloom, and depriving the stems of their leaves, parted them into halves, the tops in one parcel and the basis in another. The extracts from the base, when examined by polarization, indicated almost twice as much sugar as the extracts of the tops of equal density; and at the same time he found, that the saccharine principles abounded in the ears of the wheat, in the form of cane sugar and sugar of starch, together with a substance similar to, if not identical with, dextrine.

Ripening of Corn, and Ploughing of Green Crops for Manure.—In proportion, it has just been shown, as the fecundated ear increases in magnitude, the leaves near the root begin to grow yellow and dry in consequence of the stem drawing from them the carbonaceous materials which they contain. As the growth advances, the base of the stem becomes yellow and dry in its turn, while the upper part remains green, and continues to nourish the ear.

These beautiful researches of M. Biot afford interesting expanations of several agricultural practices hitherto not well understood, at least in a scientific point of view. For example, when the base of the stem begins to become yellow and dry, if the corn be then cut down, though the grain is not ripe, it will continue to be nourished at the expense of the green matter in the upper part of the stem, almost, if not quite as well, as if it had remained uncut, and will thus ripen well; while having been thus cut down early, much loss from shaking is prevented, besides the chance of loss by *lodging* from heavy rain and wind. M. Biot's experiments, from his well-known high character for rigid accuracy, are therefore well calculated to give farmers confidence in cutting down their corn, as soon as the lower leaves and the lower part of the stems are yellow and dry, though the upper parts be green.*

*It is a good practice to cut down every kind of grain before it is fully ripe in the grain or the straw, and that for the reasons just enumerated in the text. But, as M. Biot's observations and common practice do not exactly agree as to the symptoms which determine the time of cutting, it is

Again, as the leaves and stems of plants while green, contain sugar and other carbonaceous materials for nourishing the seeds and bringing them to maturity, it follows that, if they are in this state ploughed down into the soil, they must greatly enrich it with all the products ready prepared for the nourishment of plants.

It has been proved, indeed, by other experiments previous to those of M. Biot that the leaves and all the green parts of plants, decompose the carbonic acid gas of the air, appropriating the carbon and setting free the oxygen; and hence it has been inferred, that the carbon thus derived contributes to form their mass of sugar and gum, additional to the sap absorbed from the soil by their roots. This view is corroborated by the difference which M. Biot has shown between the composition of the leaves of wheat and the stem, which is more especially supplied from the soil. If, then, a portion of the solid frame-work of plants is derived from the air in the form of carbon, the ploughing down of green crops for the purposes of manure, gives to the soil more than the plants, while growing, had extracted from it.

We may well conclude with M. Biot that "every positive determination in science is susceptible of progress and of useful application, though these may be distant. A microscopical observation, or an optical property, which at first appears only curious and abstract, may thus in time become important to agriculturists and manufacturers."

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as well to notice the difference. In a *fine season*, farmers cut down when they find the neck of the straw immediately under the ear free of juice, when twisted round between the finger and thumb; and do not wait until "the lower part of the stems are yellow and dry," because they find in such a season the straw *to die from the ear downwards*. This fact, we conceive, does not miligate against M. Biot's *theory*, for as the absorbing power of the ear at the top of the stem is always powerful, it must be the more powerful the nearer the ear approaches maturity, and, of course, the part of the stem nearest the ear should first become dry. In a bad season, on the other hand, the lower part of the stem first becomes yellow and dry, after which, of course the crop is not allowed to stand; for, in such a season, the ear never becomes mature, having, of course, less absorptive power, whilst the vitality of the root is early destroyed by the combined effects of bad weather and ungenial state of the soil —Editor.

From the Maine Farmer.

USE OF THE ROLLER——RAISING POTATOES, &C.

Mr. Holmes:—The first knowledge I had of the roller I obtained from the N E Farmer, some years since. Being always desirous to try "new things," if they promise utility, and especially if they cost but little, I set about constructing one. As I could procure neither *stone* nor *cast iron*, and was too *poor* to do it, if they had been within my reach, I took a "junk" out of a hemlock log, about six feet in length—inserted gudgeons in the centre at each end, on which was hung a sort of frame, with a tongue like a sled.

With this machine, I went over my wheat ground, breaking every "lump," and sinking every small stone, and left the field in excellent order for the scythe.

Nor is this all the benefit derived from rolling. By pressing the soil closely round the grain, much more of it will vegetate than with the usual management—and in case of drouth, the ground will not "dry up" so quickly. As to making the ground heavy, (as some fear it will) I think it has about the same effect, with respect to that, as the hand of the housewife has, in being passed over the surface of the "brown loaf," before committing it to the oven.

Much has been said in the Farmer upon raising potatoes—each writer has rather a better method than *the others*. I am well satisfied with the method I have adopted, which is, to select a piece of grass ground, (the smoother the better) and cart on a large dressing of green barn manure, at my leisure. When ready to prepare for planting, I spread the manure evenly as possible, but no more in a day than I can turn under—turn the sod, flat and roll well immediately—then harrow length-wise of the furrows with a light harrow, till the interstices between them are filled—next mark off the rows with a small plough or chain, and plant on the surface with a covering of about two inches. I have practiced hilling lightly, but think I shall omit it altogether this year. I stir the ground well with the Cultivator.

Some of the advantages of this mode of culture I conceive to be the following:—The ground not being ploughed till late, the grass gets a good start, and being covered, together with the unfermented manure, ferments, and forms a *hot bed* which brings forward the crop surprisingly, and continues to afford nourishment in abundance, till it comes to maturity. The rolling prevents the furrows from being torn up by the harrow, and the filling of the crevices between the furrows prevents the possibility of any grass or weeds growing from the manure, and you have a clean field, if the soil is free from foul seeds, in fine order for a crop of wheat the next spring. I have pursued the same course with my corn for three years past, with the addition of a light top dressing of old manure, and I have never had better success

Farming begins to *look up* in this section of the State, and with the bounty on wheat, and the present pinching scarcity of provisions, in view, I think, with the blessing of a bountiful Providence, we shall be better supplied for the future.

HORACE WILDER.

North Dixmont, April, 1837.

From the Maine Farmer.

"A CENT'S WORTH OF SAUCE SAVES A SHILLING'S WORTH OF MEAT."

Mr. Holmes:—I sometimes scribble a little for the Farmer, and I hope when you think that the public or farmers are not interested, you will oblige me by throwing my communications under your table.—The Legislature have very wisely given an impulse to the raising of breadstuffs—the staff of life, so called—in Maine.—Though I hope considerable money will be taken from the Treasury for the premiums proposed—all can see that if more wheat be raised, more money will be saved in the State to replenish the Treasury—I am nevertheless convinced that Farmers do not pay attention enough to their Gardens, and the raising of beans, peas, and the various other varieties of sauce.

Does a cent's worth of sauce save a shilling's worth of meat? No doubt it does,—and I add that good sauce saves bread too. Beans, for instance, are a hearty sauce. One remarked to me recently, that "dear as beans are at present, they are the cheapest sauce in my family, for they save bread and meat too." I wish farmers would raise more of them, and attend more to the varieties. Sauce is also more healthy or wholesome than many things which we eat.

A LOVER OF GOOD THINGS.

Correspondence of the Springfield Repub. and Jour.

BOSTON, March 6.

The Faneul Hall Market attracts the attention of strangers. In many respects it has not its equal in the Union. It is 536 feet long, 50 feet wide, two stories high, and wholly built of granite. The centre of the building is wider and higher, being 74 feet by 55, with a dome. In the second story of the centre, is a spacious Hall, called Quincy Hall, in honor of John Quincy, Esq., who, as Mayor of Boston, contributed so much to the execution of the noble enterprise. The principle entrances are at the east and west ends—the west end fronting Faneuil Hall. This grand structure was commenced in August, 1824, and with the improvements on eaah side of the street opposite, was completed in about two years. The Market cost about $1,000,000. The greater part of the land on which the Market stands, as well as the beautiful row of stores on each side of the street opposite, has been reclaimed from the sea, by filling in with earth at different times. Many acres in other business parts of the city, have been made in the same way. The interior of the Market is divided into 128 stalls; 14 for mutton, lamb, veal and poultry; 2 for poultry and venison; 19 for pork, lamb, butter and poultry; 45 for beef; 4 for butter and cheese; 19 for vegetables, and 20 for fish. The second story of the Market is used as a depository for wood—and the Stores on South and North Market streets are built of corresponding architecture to the market. It is said there is no market in the Union which is so uniformly stocked in variety as this. Besides the usual assortments of meats and vegetables, here may be had all sorts of nuts and fruits. It is a sight for an epicure. One would think to see the great quantities of every kind of food, that there was no danger of famine. At the east end, on the outside, is a large

open stall, where a thousand funny articles, books, songs, matches, &c. are offered for sale. This is brilliantly lighted in the evening. The market is most thronged of a Saturday evening. As I entered the west end, and looked down the long avenue of more than 500 feet, with a row of lamps on each side, it seemed like an endless gallery of "fat things," with a dense crowd of buyers the whole distance. As I forced my way through, I saw a number of poor men and women looking wishfully upon the fine beef, poultry, and butter, and seeming to say, I wish my money was equal to my desires.

FARMERS' WORK.

BACON.—About Christmas, if the weather be coldish, is a good time to kill. If the weather be very mild, you may wait a little longer; for the hog cannot be too fat. The day before killing, he should have no food. To kill a hog nicely, is so much of a business, that it is better to pay a shilling for having it done, than to stab and hack and tear the carcase about. There are two ways of going to work to make bacon; in the one you take off the hair by scalding.—This is the practice in most parts of England, and all over America. But the Hampshire way, and best way, is to burn the hair off. There is a great deal of difference in the consequences. The first method slackens the skin, opens all the pores of it, makes it loose and flabby by drawing out the roots of the hair. The second tightens the skin in every part, contracts all the sinews and the veins in the skin, and makes the flitch a solider thing, and the skin a better protection to the meat. The taste of the meat is very different from that of a scalded hog; and to this chiefly it was that the Hampshire bacon owed its reputation for its excellence. As the hair is to be burnt off, it must be dry, and care must be taken, that the hog be kept on dry litter of some sort, the day previous to killing. When killed he is laid upon a narrow bed of straw, not wider than his carcase, and only two or three inches thick. He is then covered all over thinly with straw, to which, according as the wind may be, the fire is put at one end.—As the straw burns, it burns the hair. It requires two or three coverings and burnings, and care is taken, that the skin be not, in any part, burnt or parched. When the hair is all burnt off close, the hog is scraped clean, but never touched with water. The upper side being finished, the hog is turned over, and the other side is treated in like manner. This work should always be done before day-light; for in the day-light, you cannot so nicely discover whether the hair be sufficiently burnt off. The light of the fire is weakened by that of the day. Besides, it makes the boys get up very early for once at any rate, and that is something; for boys always like a bonfire.—[Cobbett's Economy.]

From the New-York Cultivator.

DUTTON CORN.

NORTHAMPTON, Jan. 18th, 1837.

JUDGE BUEL—DEAR SIR—The following is a method of culture, and result of the seed corn purchased of you last autumn, which, if you think proper, you are at liberty to give a place in the Cultivator. The variety is the twelve rowed early Dutton, or Buel corn and is the best with which I am acquainted particularly for latitudes north of 40°, on account of its early maturity, which is, I should say, two weeks earlier than the common or eight rowed kind. Out of several acres of the latter, planted the last season, I had not a bushel of sound corn, it being destroyed by the early frosts, while the Dutton was ripened and harvested on the 20th September, and did not give more than two per cent. of soft corn. In the preparation of, the method of culture, &c., I pursued the course frequently recommended by you; but was, through the whole process, exceedingly annoyed in contending with old prejudices and practices of laborers and others, who often rebelled, and were disposed to place themselves conservators over me, in spite of all resistance on my part. If their prophecies were to prove true, my corn would have been seven times blasted. Grave doubts were expressed as to the advantage of the roller, and in the preparation of the seed, (*see Cultivator, vol. 1, p. 37,*) "whoever heard of rolling corn in *hot* tar? It will be scalded, ruined, and never come up." It *all* came up, however, and why? Because being of the early variety, it was well ripened, the preceding backward season, the reverse of which was much complained of in the common kind. Then, again, "it was too thick—depend upon it, sir, when you come to look for ears, you will find nothing but stalks; two feet and a half! four stalks in a hill! it is entirely too much—it will cover the ground and you will get nothing." As to smooth hoeing, or without hills, it was a thing they had "strong doubts about."—The cultivator, however, was allowed to be "a grand thing," and clean weeding presented no objections; here of course was a long respite, and I was allowed quietly to enjoy the pleasant anticipation of a good crop. It so happened that my corn was not hid in a corner, but grew in an open field, was subject to the inspection of many a passer by, and I was much gratified by the frequent remark,—"what a fine piece of corn?" But when the harvesting came, the objector says, "you have done wrong in cutting it up, it is better to top it," and again, "you are entirely too early, it will not harden." The fact is, however, it got thoroughly hard, and brighter or better corn I never saw; it was cut the 20th September, husked and weighed the 10th November. The piece of ground measured one acre and five and a half rods, and yielded eight thousand seven hundred and eleven and a half pounds, (which, at 75 lbs. the bushel, allowed by the agricultural society,) gave one hundred and twelve and a half bushels to the acre; also, four heavy two horse loads of well cured corn stalks, worth more than a ton of the best hay.

PREPARATION OF THE GROUND, MANURE, &c.

I have a fine lot, containing six acres, lying east, and in full view from my house, slightly undulating and gently sloping, on which two or three years ago, I commenced farming in miniature, on the rotation system, that I might judge of the comparative profit of good systematic culture, (by some laughed at as a book of knowledge,) compared with the slovenly and parsimonious habit, too often persevered in, and I am so far much pleased with the result; it speaks loud in favor of good husbandry. I am well satisfied, too, that you must feed your land if you would be fed yourself. This lot has for many years, (50 or more, for aught I know,) been undisturbed by the plough, from the erroneous opinion that good grass land should remain for the scythe only. The soil is mostly a warm sandy loam; some part of it, however, is low and wet; this I have overcome by thorough draining. (On this subject I may hereafter have something to say.)

I prepared by deep ploughing last fall, a part of the above lot, carted and spread upon it the 10th of May, 35 loads of long unfermented stable dung to the acre, making five heaps to the load, dropped at five yards distance each way; this, after being carefully spread, was passed over with a heavy roller, and afterwards well harrowed, planted the 15th of May, and ashed as it made its appearance above ground.

ESTIMATE OF EXPENCES, &c.

Dr.—		
To ploughing with two yoke of cattle, 1½ days, at $3,		$4 50
Rolling and harrowing 1½ days, single team, at $2,		3 00
Seed corn,		1 00
Preparing seed corn with tar, &c.		25
Planting two days, at $1,		2 00
Three hoeings, two days each, at $1.		6 00
Horse and man 1¼ days, with cultivator, $1 50,		2 25
Cutting and binding two days, at $1,		2 00
Picking and husking seven days, at $1,		7 00
38 loads manure, at $1,	$38 00	
Carting and spreading, at 25 cents,	9 50	
	$47 50	
Deduct two-thirds for the succeeding crops in the rotation,	31 61	
		15 89
20 bushels ashes, at 12½ cents,		2 50
Spreading 1 day, at $1,		1 00
Interest on land, valued at $150		9 00
		$56 39
Cr.—		
By 62½ bushels corn, at $1 50,		$93 75
50 bushels seed do. at $2,		100 00
2 do. soft do. at 50 cents,		1 00
4 loads stalks,		15 00
		$209 75
Deduct expenses,		56 39
Profit,		$153 36

I have not had experience enough to know which is the most preferable, to plough old sward land in the fall, and spread the manure on the surface the following spring, or to spread the manure in the spring before ploughing, and then turn it in. I think much may depend on the season, in the first practice; if the season should be dry, may not a

good deal be dissipated by the winds? and again, if it should be wet, may not the root reap a greater advantage, than if it lay beneath the turf? I will thank you for your views on the subject.*

Although I used my own teams, and hire my labor by the month, at 12 to $14, yet in consequence of rainy weather, broken days, &c., I think it but right to charge the fair price of labor by the day, both for man and team. In estimates of this kind, the labor is frequently charged per day at the average of the price per month, which makes quite a different result. The estimate of corn, at $1 50, may appear to many overrated, nevertheless, it is a fact, that corn of an inferior quality is selling with us at that price.

Yours, very respectfully,
H. G. Bowers.

N. B. Since writing the above, it occurred to me that, although in the preparation of seed corn, tar is recommended chiefly, as a protection against birds, it may also have another very important effect, (thereby saving a replanting in consequence of wet weather,) in providing a coat, impervious to the superabundant water, until the sun shall, by its genial warmth, cause the germ to disengage itself from its confinement.

* *Old* sward, for corn land, is best ploughed in the fall, and if long manure is at command, it may be buried in the operation. It will undergo but slight if any fermentation before ploughing, and the soil will imbibe what it gives off of nutriment. A clover lay is best ploughed early in May, having the manure previously spread. If, in the first, manure is not at command, we would recommend that the plough be set deep, and that the manure be buried in the spring, immediately preceding planting, by a superficial furrow, which shall leave the sod as much as possible undisturbed.—[Conductor.]

From the Farmer and Gardener.

CULTURE OF RUTA BAGA.

Mr. James M. Lawton, in a communication in the Cultivator, gives the following rules for the preparation of the soil, and the culture of the Ruta Baga. The conclusions at which he arrives are the result of many years experience and close observation.

1. The land, he says properly adapted to the nature of the plant, is a strong loam.

1. The land should be ploughed early in the spring, in order that the sward, if it have one, may rot by the 10th of June.

3. The land should be made perfectly mellow and smooth, and a good coat of manure, that is fine, say sheep or barn manure should be put on.

4. Throw the land into ridges 24 inches apart, with a small horse plough.

5. Roll down the ridges by a light roller, or other instruments; make a light furrow, say an inch deep, drill in the seed on or about the 15th of June: the seed should be 10 inches apart in the drill, and when the plants come up, all but one plant should be pulled up.

6. Dress the plants three times in a season, that is, keep the weeds out, and the earth stirred about the plants; as they are first breaking the ground they must be powdered with plaster of Paris,—and twice afterwards also—when they receive the two last hoeings.

Mr. Lawton further adds, that he has found the above rules, when closely followed, never to fail in producing a good crop; that last year he raised from 90 rods, that is from half an acre and 10 perches of land, 605 bushels of sound, close grained Ruta baga turnips, on land a distance from the house and barn, on which, never to his knowledge, a spoonful of manure had been placed until within a few days of the time he put the seed in the ground. This product was equal to 1075⅜ bushels per acre. The success of Mr. Lawton should surely serve to stimulate every farmer and planter to at least appropriate an acre or two to the culture of this excellent and hardy root. Unlike the other members of the turnip family, it preserve through the hardest winter in the field, if the precaution be taken to throw a furrow up against the rows just as the hard frosts set in, and may be drawn thence for use, as occasion may suit. They are also more firm in meat, and more nutritious than any other turnip. Horses and cows fed upon them do not scour as when kept on the other varieties.

HORTICULTURAL SOCIETY OF PENNSYLVANIA—LIBERAL PREMIUM.

We have been favored with a copy of the advertisement of this society offering premiums for "*culinary* vegetables, fruits, and flowers, for 1837," and on looking over them we are gratified to find that its members are influenced by feelings of enlarged liberality.

We comply with their request to publish the subjoined, with pleasure; the generous spirit which animates the institution is to be seen in this noble effort to preserve one of the most delicious of fruits, from its most deadly enemy, and we sincerely hope that the pecuniary stimulant they offer will serve to urge the nursery men and horticulturists of our country, to turn their attention seriously towards the discovery of the preventive in question.

BLIGHT IN PEAR TREES.

The Pennsylvania Horticultural Society, anxious to promote the discovery of preventive for the disease usually termed *blight* in Pear Trees, offers a premium of FIVE HUNDRED DOLLARS, to be paid the person who shall discover and make public an effectual means of preventing its attack. The premium not to be awarded until after the expiration of three years from the publication of the preventive, nor until the Society shall be fully satisfied of its efficacy. Communications on the subject may be addressed per mail to David Landreth, Cor. Secretary, Philada.

From the New-England Farmer.

Manure.—Stable and barn-yard manure is rendered of little value by long exposure to the air, sun and wet weather. Indeed, every moment of such exposure takes away from such manure some part of its fertilizing principles. The following remarks on the waste of manure by exposure, have been given in the N. E. Farmer, vol. v. page 342, but may be new to some of our more recent subscribers.

"He who is within the sphere of the scent of a dung-hill," says the celebrated Arthur Young, "smells that which his crop would have eaten, if he would have permitted it. Instead of manuring the land, he manures the atmosphere; and before his dung-hill is finished he has manured another parish, perhaps another county." Stable and barn-yard manure should be kept as carefully from the sun and rain as grass, which has been cut for hay. When cattle have been yarded over night, it will be well to throw their manure into heaps, and cover them with a little loam or marsh mud, previously prepared for that purpose.

"Earth is a powerful absorber of all the gasses which arise from putrefaction. But a layer of common soil along the top of a fermenting dung-hill from 12 to 18 inches thick, and allow it to remain there while the process is carrying on with activity, and afterwards separate it carefully from the heap, and it will have been impregnated with the most fertilizing virtues. The composts, which of late have attracted so universal attention, and occupied so large a space in all agricultural publications, originated in the discovery of this absorbing power of the earth, and in the application of it to the most beneficial purposes. A skilful agriculturist would no more think of allowing a violent fermentation to be going on in this dung-hill, unmixed with earth, or other matter to fix and secure the gaseous aliments, than the distiller would suffer his apparatus to be set at work, without surmounting his still with the worm to cool and condense the rarified spirits, which ascend in evaporation. In both the most precious matter is that which assumes the aeriform state; and to behold it escaping with indifference, is a demonstration of the most profound ignorance."—[Letters of Agricola.]

Infusion of Walnut Leaves to destroy Insects.—It appears by a communication to the London Horticultural Society, by Sir Charles M. L. Monck, Bart., that worms which infested plants in pots, were destroyed by a pint of an infusion of walnut leaves given to each pot. The worms quickly emerged from the mould to the surface, and were removed. This treatment was repeated the following week, when a few more worms were extracted; the plants, which had been sickly, after this application resumed their health and blossomed strongly. This success induced Sir Charles to try the experiment on orange trees, and other plants in pots, and it was attended with equal success. He thinks that the infusion is beneficial, not only in destroying worms, but that it acts also as a manure. The infusion is made by pouring boiling water on fresh walnut leaves; which having stood till cold is ready for use.

Forsyth recommends a decoction of walnut leaves as an antidote to insects, and a decoction of elder leaves is also said to answer the same purpose.

POTATOES.—In Prussia the Potatoe is cultivated with peculiar success;—as the stalk grows, the earth is heaped up, leaving only three leaves at the top; roots are thus greatly increased, and the produce is said to be astonishing.

FAT OXEN.—Messrs. Hillman and Thayer, of this town, slaughtered a pair of oxen last week, from the stall of Mr. George Cook, which presented as fine specimens of beef as we ever witnessed. We saw a hind quarter as it lay in the butchers' cart, and it appeared to be almost a complete mass of fat. The fat on the rounds was apparently two or three inches thick. Our stomach yearned, as may well be supposed, for a good cut from the tender loin, but we were compelled to turn disappointed away, for the price was fourteen cents a pound. These oxen weighed 4,385 on the hoof, and after they were dressed, 3,190 pounds. The butchers paid ten dollars the hundred pounds.—[Hampshire Gazette.]

Advertisements.

AVERY'S ROTARY STEAM ENGINES.—AGENCY.—The subscriber offers his services to gentlemen desirous of procuring Steam Engines for driving SAW-MILLS, GRAIN-MILLS, and OTHER MANUFACTORIES of any kind.

Engines only will be furnished, or accompanied with *Boilers* and the necessary *Machinery* for putting them in operation, and an Engineer always sent to put them up.

Information will be given at all times to those who desire it, either by letter or by exhibiting the engines in operation in this city.

Inquiries by letter should be very explicit and the answers shall be equally so.

D. K. MINOR,
30 Wall-st., New York.

DRAWING INSTRUMENTS.—E. & G. W. Blunt, 154 Water-street, New-York, have received, and offer for sale, Drawing Instruments of superior quality, English, French, and German Manufacture.

They have also on hand Levels of superior quality at low prices.

☞ Orders received at this office for the above Instruments.

FOR SALE AT THIS OFFICE,

A Practical Treatise on Locomotive Engines, with Engravings, by the CHEVALIER DE PAMBOUR—150 pages large octavo—done up in paper covers so as to be sent by mail—Price $1 50. Postage for any distance *under* 100 miles, 40 cents, and 60 cts. for any distance exceeding 100 ms.

ALSO—*Van de Graaff on Railroad Curves*, done up as above, to be sent by mail—Price $1. Postage, 20 cents, or 30 cents, as above.

ALSO—Introduction to a view of the works of the *Thames Tunnel*—Price *fifty cents*. Postage as above, 8 cents, or 12 cts.

⁂ On the receipt of $3, a copy of each of the above works will be forwarded by mail to any part of the United States.

MECHANICS' FAIR.

Notice to Mechanics, Artisans, Manufacturers, &c.—The undersigned give notice that the first Annual FAIR of the Massachusetts Charitable Mechanics' Association will be held in the city of Boston, in September next, commencing on Monday, the 18th, and continuing at least three days.

The Association have placed at the disposal of the Board of Managers, the sum of Five Thousand Dollars, to enable them to conduct the Fair upon a liberal scale; and they hope to be able to render satisfaction to all who may feel disposed to offer articles for exhibition.

Medals or Diplomas will be awarded to the owners of all articles that may be deemed worthy of such distinction; and the Managers intend that the strictest impartiality and fairness shall be observed in the distribution of Premiums.

The Managers, in furtherance of the object they have in view, invite contributions of articles from every department of industry; of choice specimens of American ingenuity and skill; rare and valuable domestic productions, natural or artificial; the delicate and beautiful handiwork of females; useful labor-saving machines, implements of husbandry, and new models of machinery, in all their varieties.

Judges will be appointed to examine all articles offered, and the managers will award a gold or silver medal, or a diploma, to all articles that may be pronounced by the judges worthy of reward.

Articles intended for exhibition, must be delivered on or before Wednesday, September 13th.

Arrangements will be made to exhibit, *in operation*, any working models that may be offered, which will render the exhibition useful and interesting, and the managers respectfully invite contributions in this branch. A careful and competent superintendent will be appointed to take chare of all models sent for this purpose.

Board of Managers.

Stephen Fairbanks,	Jos. T. Buckingham,
John Rayner,	James Clark,
William Adams,	Henry W. Dutton,
Uriel Crocker,	George Darracott,
Gardner Greenleaf,	Wm. S. Pendleton,
James L. Homer,	Charles A. Wells,
James Barry,	Henry Bailey,
Joseph Tilden,	Jonas Chickering,
Ephraim Harrington,	Henry H. Barton,
Joseph Lewis,	Thomas Boyd,
Walter Frost,	Wm. Uunderwood,
Thomas J. Shelton,	George G. Smith,

John G. Rogers.

P. S. For any further information address JAMES L. HOMER, Corresponding Secretary, Boston.

Boston, March 24, 1837. m28–ts1

A COURSE OF INSTRUCTION IN CIVIL ENGINEERING, by informal lectures, to occupy two months, commencing the 1st week of May.—Comprising

The use of the theodolite, level, Compass plain table, cross, and sextant explained upon the instruments themselves: topographical drawing executed under supervision; survey of routes; problems of excavation and embankment; railroad curves; all the usual details of construction upon common roads, railroads, and canals; including bridges, culverts, tunnels, and the various kinds of motive power; nature, strength and stress of materials; masonry, carpentry and constructions in iron; alluvial deposites, guaging of streams, &c.—The whole purely elementary. Terms of admission to the course, $20.

Apply to C. W. Hackley, Professor of Mathematics in the University, 32 Waverly Place.

TRANSACTIONS OF THE INSTITUTION OF CIVIL ENGINEERS OF GREAT BRITAIN.

The first volume of this valuable work, has just made its appearance in this country. A few copies, say *twenty-five* or *thirty* only, have been sent out, and those have nearly or quite all been disposed of at *ten dollars* each—a price, although *not* the *value* of the work, yet one, which will prevent many of our young Engineers from possessing it. In order therefore, to place it within their reach, and at a convenient price, we shall *reprint* the entire work, with all its engravings, *neatly done* on wood, and issue in six *parts* or *numbers*, of about 48 pages each, which can be sent to any part of the United States by mail, as issued, or put up in a volume at the close.

The price will be to subscribers *three dollars*, or *five dollars* for two copies—*always in advance*. The first number will be ready for delivery early in April—Subscriptions are solicited.

NOTICE TO CARPENTERS.

A number of Carpenters are wanted to lay the superstructure of the Georgia Railroad, to whom liberal wages will be given.

The road traverses an elevated ridge which is entirely free from any local cause of sickness.

JOHN EDGAR THOMSON, Ch. Eng.
Engineers Office, May 22, 1837. 22—3t*
Augusta, Geo.

NOTICE TO CONTRACTORS.

NOTICE is hereby given that the grading of the 'Buffalo and Mississippi Railroad,' for a double track, between Michigan city and La Porte, a distance of 12 miles, will be let at public out-cry, to the lowest bidder, at La Porte, on Wednesday, the 14th day of June next

The Maps, Profiles and Estimates of the route will be ready for examination at the Engineer's office in La Porte, after the first of June.

R. STEWART, President.
Michigan City, April 23, 1837. 22—3t m

TO CONTRACTORS.

PROPOSALS will be received until Tuesday evening, the 27th June next, at the office of the Wrightsville, York and Gettysburgh Railroad, in York, for laying a single track of Rails on 12 miles of the above road, extending from Wrightsville to York.

☞ Plans and specifications of the work will be exhibited in the office after Monday, the 8th inst., and further information will be furnished by Mr. J. F. HOUSTON, P. M., at York.

F. W. MIFFLIN, C. E.
May 8, 1837. 20—3t